

IN THE CLAIMS

1. (Thrice amended) A multiple-die, low-profile semiconductor device comprising:

[a.] a lead-frame paddle supported by a lead frame;

[b.] a controlled, first[,] thin[-]_adhesive layer of about 0.001 inches affixing a first die above the paddle;

[c.] a plurality of thin wires having [a] first low-loop wire [bond] bonds to a plurality of first die-bonding pads[, said wire bond having a wire height above the bonding pad of about 0.006 inches,] and [a second] other wire [bond] bonds to a plurality of adjacent lead-frame lead fingers;

[d.] a second thin[-]_adhesive layer [of about 0.008 inches] affixing a second die above the first die;

[e.] a second plurality of thin wires having second low-loop wire bonds to a plurality of second die-bonding pads and [second] other wire bonds to the plurality of lead fingers;

[f.] two additional dies affixed above the second die by additional subsequent layers of adhesive [of about 0.008 inches] and having additional thin wires bonded to additional bonding pads and lead fingers; and

[g.] an encapsulation layer surrounding all dies, adhesive layers, and thin wires wherein a total encapsulated-package height is at most about 0.110 inches.

2. (Thrice amended) A multiple-die, low-profile semiconductor device comprising:

[a.] a lead-frame paddle supported by a lead frame;

[b.] a controlled, first[,] thin[-]_adhesive layer of about 0.001 to 0.005 inches affixing a first die above the paddle;

[c.] a plurality of thin wires having [a] first low-loop wire [bond] bonds to a plurality of first die-bonding pads[, said

low-loop wire ball bond having a wire height above the bonding pads of about 0.006 inches]and [a second] other wire [bond] bonds to a plurality of adjacent lead-frame lead fingers;

[d.] a second thin[-]_adhesive layer [of about 0.008 to 0.010 inches] affixing a second die above the first die;

[e.] a second plurality of thin wires having second low-loop wire bonds to a plurality of second die-bonding pads and [second] other wire bonds to the plurality of lead fingers;

[f.] an encapsulation layer surrounding all die adhesive layers and thin wires wherein a total [encapsulation-layer] encapsulated package height is at most about 0.070 inches.

3.-12. (Canceled)

13. A semiconductor device package, comprising:

a stacked assembly, including:

a carrier;

at least four semiconductor dice supported by the carrier, the carrier and the at least four semiconductor dice arranged in a superimposed relation, with each of the at least four semiconductor dice being at least partially superimposed with the carrier and at least partially superimposed relative to one another; and

dielectric adhesive elements for securing the carrier and the at least four semiconductor dice in the superimposed relation, wherein each dielectric adhesive element is about 0.001 to 0.005 inches thick;

leads extending laterally outward from the stacked assembly and including interior portions located laterally adjacent to the stacked assembly and exterior portions at opposite ends from the interior portions;

conductive elements for establish in^ electrical communication between the at least four semiconductor dice and the interior portions of the leads; and

an encapsulant surrounding the stacked assembly, the conductive elements, and the interior portions of the leads,

a combined thickness of the stacked assembly and the encapsulant being no greater than 0.110 inches.

14. The semiconductor device package of claim 13, wherein the carrier comprises a paddle associated with the leads.

15. The semiconductor device package of claim 13, wherein the at least four semiconductor dice are located on a same side of the carrier as one another.

16. The semiconductor device package of claim 13, wherein the conductive elements comprise bond wires.

17. The semiconductor device package of claim 13, wherein the conductive elements comprise bond wires extending from bond pads of each semiconductor die of the at least four semiconductor dice.

18. The semiconductor device package of claim 17, wherein at least one semiconductor die of the at least four semiconductor dice has substantially the same lateral dimensions as at least one other semiconductor die of the at least four semiconductor dice.

19. The semiconductor device package of claim 18, wherein the at least one semiconductor die is located adjacent to and substantially superimposed over the at least one other semiconductor die.

20. The semiconductor device package of claim 18, wherein all of the at least four semiconductor dice have substantially the same lateral dimensions.

21. The semiconductor device package of claim 20, wherein all of the at least four semiconductor dice are substantially superimposed relative to one another.

22. A semiconductor device package, comprising:

a stacked assembly, including:

a carrier;

at least four semiconductor dice supported by the carrier, the carrier and the at least four semiconductor dice arranged in a superimposed relation, with each of the at least four semiconductor dice being at least partially superimposed with the carrier and at least partially superimposed relative to one another; and

dielectric adhesive elements for securing the carrier and the at least four semiconductor dice in the superimposed relation, wherein each dielectric adhesive element is about 0.001 to 0.005 inches thick;

an encapsulant surrounding the stacked assembly, the conductive elements, and the interior portions of the leads;

conductive elements for enabling communication between an exterior of the encapsulant and the at least four semiconductor dice within the encapsulant,

a combined thickness of the stacked assembly and the encapsulant being no greater than 0.110 inches.

23. The semiconductor device package of claim 22, wherein the carrier comprises a paddle and leads associated with the paddle.

24. The semiconductor device package of claim 23, wherein the conductive elements include:

the leads, which leads extend laterally outward from the stacked assembly and include:

interior portions located laterally adjacent to the stacked assembly; and

exterior portions at opposite ends from the interior portions; and

bond wires extending between bond pads of the at least two semiconductor dice and interior portions of corresponding leads.

25. The semiconductor device package of claim 24, wherein all of the at least four semiconductor dice have substantially the same lateral dimensions as one another.

26. The semiconductor device package of claim 25, wherein the at least four semiconductor dice are substantially superimposed relative to one another.

27. The semiconductor device package of claim 22, wherein the at least four semiconductor dice are located on a same side of the carrier.

28. A semiconductor device, comprising:

a carrier;

an adhesive on a surface of the carrier, wherein the adhesive is about 0.001 to 0.005 inches thick;

a first semiconductor die with a back side secured to the carrier by the adhesive, the first semiconductor die also including a top surface and a first set of bond pads on the top surface;

a first set of bond wires physically coupled to the first set of bond pads, each bond wire of the first set protruding a first height from the top surface of the first semiconductor die;

a first adhesive on the top surface of the first semiconductor die, a thickness of the first adhesive exceeding the first height each bond wire of the first set protrudes from the top surface of the first semiconductor die, the first height being about 0.001 inch to about 0.005 inches thick;

a second semiconductor die with a back side secured to the top surface of the first semiconductor die with the first adhesive, the second semiconductor die also including a top surface and a second set of bond pads on the top surface; and

a second set of bond wires physically coupled to the second set of bond pads, each bond wire of the second set protruding a second height from the top surface of the second semiconductor die.

29. The semiconductor device of claim 28, further comprising:

an encapsulant encapsulating the carrier, the first semiconductor die, the first adhesive, the first set of bond wires, the second semiconductor die, and the second set of bond wires.

30. The semiconductor device of claim 29, wherein the carrier comprises a paddle and associated leads.

31. The semiconductor device of claim 30, wherein portions of the leads protrude from the encapsulant.

32. The semiconductor device of claim 28, further comprising:

a second adhesive on the top surface of the second semiconductor die, a thickness of the second adhesive exceeding the

second height each bond wire of the second set protrudes from the top surface of the second semiconductor die;

a third semiconductor die with a back side secured to the top surface of the second semiconductor die with the second adhesive, the third semiconductor die also including a top surface and a third set of bond pads on the top surface; and

a third set of bond wires physically coupled to the third set of bond pads. each bond wire of the third set protruding a third height from the top surface of the third semiconductor die.

33. The semiconductor device of claim 28, further comprising:

a third semiconductor die with a top surface and a third set of bond pads on the top surface;

a third set of bond wires physically coupled to the third set of bond pads, each bond wire of the third set protruding a third height from the top surface of the third semiconductor die;

a second adhesive on the top surface of the third semiconductor die, a thickness of the second adhesive exceeding the third height each bond wire of the third set protrudes from the top surface of the third semiconductor die;

a fourth semiconductor die with a back side secured to the top surface of the third semiconductor die with the second adhesive, the fourth semiconductor die also including a top surface and a fourth set of bond pads on the top surface; and

a fourth set of bond wires physically coupled to the fourth set of bond pads, each bond wire of the fourth set protruding a fourth height from the top surface of the fourth semiconductor die.

34. The semiconductor device of claim 33, wherein lengths of the bond wires of the first set and lengths of the bond wires of the third set are substantially the same.

35. The semiconductor device of claim 19, wherein lengths of the bond wires of the second set and lengths of the bond wires of the fourth set are substantially the same.